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Enterprise Information Technology Architecture

Information Technology can enable government to restructure operations and rethink service delivery mechanisms. These changes are necessary for government to work better, cost less, and become more citizen focused.

Standards and policies provide the basis for the development of a common statewide information technology architecture that enables efficiency and effectiveness in government. These standards and policies direct technology purchases and implementation, ensure the compatibility of systems, and improve communication between systems and government entities.

North Dakota Technology Vision

□ State government should be customer focused.

□ State government should be efficient.

□ State government should be well managed.

□ State government should provide the leadership for developing a shared infrastructure.

Information Technology Strategies

Information technology strategies also serve as a guide to agencies in their planning for and implementation of technologies.

Standards and policies establish specific rules for the development of the technology infrastructure; however, statewide technology strategies establish the direction of technology in North Dakota. These strategies set the direction for each component of the technology infrastructure and provide a foundation for the specific standards and policies.

Information technology strategies also serve as a guide to agencies as they plan for and implement technologies. The following strategies and proposed strategies provide guidance for the coordinated development of the state information technology architecture, thereby providing the necessary building blocks with which to attain the North Dakota technology vision.

Statements of direction follow each strategy.

Strategy: Operating Systems and Platforms

Operating systems and platforms will support a highly networked, workstation based, distributed databases architecture. Existing platforms in this architecture include the Information Technology Department's enterprise server, which currently runs network applications and databases as well as legacy systems.

The state standards will reflect the industry trend toward open systems and advance the implementation of a consistent end-user interface to a variety of distributed computing services. Operating systems will support a wide range of commercially available software and development tools and the system platforms will allow for application migration to other platforms as they grow.

Support costs will be reduced through standardization within agencies across the enterprise. Purchasing policies will support the efficient and timely purchase of products that meet the standards.

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Statement of Direction:

◊ Ensure the delivery of government information and services anytime, anywhere - 24 hours a day, 7 days a week (24 X 7).

◊ Maintain high-availability systems through the implementation of system redundancy, mirroring, efficient backup systems and other technologies that minimize system downtime.

◊ Coordinate the establishment of improved state purchasing contracts with the State Procurement Office to facilitate the prompt purchase of new and replacement hardware at the best possible unit cost.

◊ Implement Windows 2000 and Active Directory to enhance state, as well as local agency, network administration and reduce the cost of network administration.

◊ Incorporate multiple platforms for web applications servers with Unix or NT as the preferred operating systems.

◊ Centrally administer software maintenance and upgrades to reduce support costs.

Strategy: Network Services

Communication between agencies and with external customers requires a single, secure, integrated wide area network that is reliable, widely available, and allows for flexible growth. The network architecture will be based on common, open, non-proprietary protocols and on industry and product based standards.

Network capacity will provide sufficient bandwidth for future expansion and multiple data formats, including voice and video. Commercial services will be used when appropriate and economically justified. Remote access will be available to state agencies with mobile employees or distant offices.

Political subdivisions will be provided the opportunity to connect with state agencies and resources.

Statement of Direction:

◊ Complete the integration of the new state broadband network in the fall of 2001. This network will carry voice, video and data from state and local government, education, and libraries over a Asynchronous-Transfer-Mode (ATM) network system.

◊ Replace network routers and hubs with switches to develop a flatter, switch-based network.

◊ Complete the conversion of all non-TCP/IP based networks to the TCP/IP standard.

◊ Evaluate wireless technology development and its application for the improved delivery of state information and services.

◊ Upgrade the statewide radio communications network from analog to digital.

◊ Continue to evaluate the technology of voice over IP.

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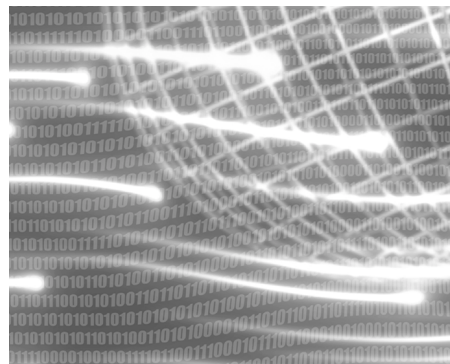
Strategy: Application Development

All application development must support the mission and business objectives of the agency.

To maximize the productivity of system developers, application development will use common processes, languages and tools.

When designing an application, the following requirements should be considered:

• Performance
• User requirements for ease of use
• Ongoing operations and support costs
• Internet accessibility

The use of reusable objects will be considered to reduce development costs.

When possible, development technologies will be used that allow applications to migrate between platforms as they grow.

Databases should be independent of the application to allow for system development flexibility.

Before development or purchase of a new application, the availability of appropriate maintenance and support must be evaluated.

Along with rapid changes in technology, application development advancements will be evaluated and migration processes to the new technology developed as needed.

The number of web enabled applications will grow as the Internet becomes the common vehicle for access to public information.

Statement of Direction:

◊ Evaluate the use of vendor or commercial software, whenever possible, to effectively support the agency business functions and reduce development time and cost.

◊ Apply CORBA (Common Object Request Broker Architecture) development techniques to provide reusable objects that cross development languages thereby reducing development cost.

◊ Continue the evolvement of the North Dakota web portal as the primary vehicle for citizen access to all state agency services and information.

◊ Continue the use of web browser technology as the client of choice for client server applications thus minimizing user support and installation of client application software.

◊ Move toward Java and XML software development technologies that support many web designer tools and runs on all platforms.

Strategy: Data Management

Data is the raw material from which information is produced and the quality, reliability and integrity of the data must be maintained for the information to be useful.

As a capital resource, information will be shared wherever possible, however, definitions of the data must be understood so that it is used consistently across the organization.

Public data warehouses will be considered as a vehicle to provide access to information in an easy to use fashion.

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Databases should allow for the storage of multiple object types thereby enhancing the value of the data.

The state will move to the use of relational database management systems because of advantages in terms of access, flexibility and ease of use.

The investment in application development should be protected from changes in vendor direction by choosing, when possible, database management systems that are independent of the platform and application development tools.

The standard will include several commercial database management systems designed to target specific markets.

A database management system should be chosen for the application based on the following requirements:

• Size of workgroup
• Accessibility
• Security
• Ease of use
• Anticipated growth
• Business needs
• Performance
• Support and maintenance requirements
• Cost
• Size of database
• Portability
• Product stability

Statement of Direction:

◊ Continue the development of and the conversion of application systems from legacy databases, such as ADABAS, to relational database systems.

◊ Apply the use of data warehousing technology to improve the efficiency of application systems and the availability of data.

Strategy: Web Development

The development of dynamically linked web sites in an accessible, user-friendly format that provides quick, simple access to government information and services. Reducing costs and streamlining government by providing greater access to information and more convenient government services.

Statement of Direction:

◊ Continue the delivery of customer focused access to government information and services on the web as well as marketing North Dakota government services via e-commerce.

◊ Develop and use standardized functions and processes, such as the credit card payments, to control development costs plus maintain a common look and feel in web applications.

◊ Enhance the delivery of government information and products with the integration of voice, video and graphics in web applications.

Strategy: Telecommunications

State government, including higher education, should have highly reliable telephone systems. These systems should provide state of the art features that enhance the productivity of state employees, academics, researchers, students, and afflitates and allow better citizen access.

Statement of Direction:

◊ Expand the application of Interactive Voice Response (IVR) to supplement the 24 X 7 availability of government information and products.

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Strategy: Office Automation

Office automation software will enhance the efficiency and productivity of state personnel.

Office automation product standards will be used to maximize information sharing and will be supported by purchasing options such as state contracts and site licensing.

Each agency will be responsible for the management of its software licenses.

The use of office suite software provides for the integration of software applications and allows for the easy transfer of data from one application to another.

E-mail communication is a very important function within and outside state government and requires high reliability and availability.

E-mail systems need the capability to include attachments as a way of sharing information

The direction of the state e-mail system is towards an enterprise mail system with all mail routed to a single domain for state agencies, excluding higher education, and an easily accessible state e-mail directory.

The Internet, via agency web sites, has become the vehicle for public access to information, replacing or augmenting paper publications. This will drive the need for office automation products that support HTML as a language for formatting information.

Statement of Direction:

◊ Use regularly planned upgrades of office automation software to reduce the number of versions supported within an agency and improve information sharing.

◊ Coordinate with the State Procurement Office for the creation of state contracts to improve the acquisition of agency business application products.

◊ Promote the state enterprise e-mail system as the e-mail system of choice for all state entities.

Strategy: Document Imaging

A document imaging system can potentially reduce paper document storage costs, improve document sharing, provide faster access to documents, and route documents electronically.

Such systems can also eliminate the delays inherent to the handling of paper, thereby improving customer service though faster access to information.

All paper documents requiring access by multiple users or applications are candidates for document imaging.

As with all new technology, a cost benefit analysis should be prepared prior to the purchase of such a system.

Statement of Direction:

◊ Establish a core EDMS enterprise system accessible to all state agencies.

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Strategy: Video Conferencing

Video conferencing is encouraged as an effective means of increasing productivity, extending services and reducing travel time and expense.

Standards and policy will provide for the flexible expansion and maximum connectivity of state video conferencing facilities with each other and with external users.

The benefits of video conferencing may be further expanded by the use of emerging technologies such as desktop video and IP multicasting.

Statement of Direction:

◊ Expand the available interactive video options on the new broadband statewide network.

◊ Improve the availability of shared services to all state entities, schools and political subdivisions.

Strategy: Project Management

Projects are by definition a temporary process designed to achieve a clearly defined goal or objective within given resource constraints such as time and budget.

The standards and policies will ensure that a disciplined, managed, and consistent approach will be used to manage projects, resulting in the delivery of quality products, on time and within budget.

Project management, by its very nature, is an iterative process involving planning, monitoring, evaluating and taking corrective action throughout the project.

Because information technology projects vary in size and scope, project management guidelines must be flexible enough to accommodate a wide variety of projects from small, well-defined efforts with readily achievable goals to large, complex or risky ventures.

Statement of Direction:

◊ Establish a common understanding of project management and promote the successful management and completion of information technology projects.

◊ Promote the certification of project managers of large projects.

Strategy: Geographic Information Systems (GIS)

The development of an enterprise GIS system will provide for the sharing of digital spatial data among North Dakota agencies, departments, institutions, and the public.

An enterprise system facilitates the development of efficient and cost effective GIS in state entities and promotes the integration of information and maximizes the availability and use of data among state entities.

Statement of Direction:

◊ Implement a core GIS data warehouse or hub to serve as centralized storage of all spatial data accessible to all agencies and the public.

◊ Promote the development of web browser access to GIS information.

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Strategy: Security

Security policies and standards cover the physical and electronic access to information as well as the transmission, storage, and processing of information. Security measures will be taken to prevent unauthorized modification or the destruction of critical information or systems. Implementation of security measures must also protect the confidentiality of the sensitive data from unauthorized access.

Risks associated with unauthorized access should be analyzed and balanced against the cost of protecting the information to ensure that business activities are not unduly hindered or unnecessary costs incurred. The owning agency shall identify the security requirements of their information based on legal requirements and agency policy and will authorize access to the data on a need-to-know basis.

Maintaining the security of the data is a joint responsibility between Information Technology Department, state agencies, and their customers who access the data.

Statement of Direction:

◊ Secure remote network access by the implementation of Virtual Private Networks (VPN).

◊ Use secure web transactions in the transmission of data to and from state entities.

◊ Implement policies and procedures for the use of digital signatures as the approved authorizing signature on electronically submitted forms and documents.

◊ Ensure user privacy on state web sites by implementation of the fair information practice principles of notice, choice, access and security.

◊ Implement intrusion prevention and detection tactics, and strengthen policies and standards, in addition to security awareness training, to ensure best practices are implemented to reduce risk.